PATENT ABSTRACTS OF JAPAN

(11)Publication number : 11-117946
(43)Date of publication of application : 27.04.1999

(51)Int.Cl. F16D 7/02

(21)Application number : 09-279997
(22)Date of filing : 14.10.1997

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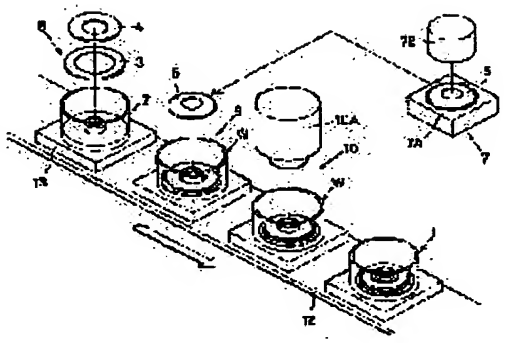
(54) TORQUE ADJUSTING DEVICE FOR FRICTION CLUTCH

(57)Abstract:
PROBLEM TO BE SOLVED: To make correct torque adjustment by computing the unit control quantity from the measured value to the specified flexure quantity of an initially coned disc spring, and making a workpiece with the initially coned disc spring assembled thereto and control quantity data correspond to each other to control a caulking unit.
SOLUTION: An initially coned disc spring 5 is mounted as a single body on a load measuring unit 7, and load is applied to the spring 5 to measure load at the time of the specified quantity of flexure being generated and to transfer it to an arithmetic unit. Caulking dimensions are computed from transferred data, converted into the pressure cylinder moving quantity and transferred to a matching means. A workpiece W in which parts other than the spring 5 are assembled to the spring 5 finished with load measurement, by an initially coned disc spring assembling unit 9, is transferred to a caulking unit 10 by a transfer means 12. After confirming correspondence with the measured data of the spring 5 by the matching means, a caulking punch 10A is lowered by the specified quantity to plastically deform the outer periphery of a boss part, and fixed in a position where the specified quantity of flexure is generated to the spring 5. The flexure quantity of the spring 5 can therefore be positively controlled so as to be able to make correct torque adjustment.



LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

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CLAIMS

[Claim(s)]
[Claim 1] The bracket which has the body prepared by carrying out an abbreviation rectangular cross to disk-like the plate section and this plate section. The rotation disk which rotates when it is allotted on the aforementioned plate section and predetermined torque is added, the fixed disk which pinches this rotation disk between the aforementioned plate sections, and carries out friction engagement with the aforementioned rotation disk, and the disk spring pressurize the aforementioned fixed disk to the aforementioned rotation disk by carrying out caulking fixation at the aforementioned body, and generating the predetermined amount of bending to the aforementioned fixed disk. The load measurement unit which is the torque adjusting device of the friction clutch equipped with the above, and measures beforehand the load at the time of making the aforementioned disk spring generate the aforementioned predetermined amount of bending, The part attachment unit which attaches the aforementioned rotation disk and the aforementioned fixed disk to the aforementioned bracket, The disk spring attachment unit which attaches the aforementioned disk spring [finishing / measurement] to the work in the state where the aforementioned rotation disk and the aforementioned fixed disk were attached to the aforementioned bracket in this part attachment unit, in the aforementioned load measurement unit, The caulking unit which makes the aforementioned disk spring generate the predetermined amount of bending for the aforementioned body in total to the work with which the aforementioned disk spring was attached, The control unit which controls the operation of the aforementioned caulking unit based on the measured value measured in the aforementioned load measurement unit, It has a transfer means to transfer the aforementioned disk spring and the aforementioned work to a position automatically according to the order of a process. the aforementioned control unit The arithmetic unit which computes the controlled variable of the aforementioned caulking unit from the measured value measured in the aforementioned load measurement unit, The matching means to which the work with which the aforementioned disk spring [finishing / measurement] was attached in the aforementioned load measurement unit, and the controlled-variable data computed with the aforementioned arithmetic unit are made to correspond, It is characterized by having cylinder-control equipment which controls the operation of the aforementioned caulking unit based on the aforementioned controlled-variable data from this matching means after the aforementioned work and the aforementioned controlled-variable data have corresponded.
[Claim 2] It is the torque adjusting device of the friction clutch which indicated to the claim 1 characterized by for the aforementioned load measurement unit to possess the 1st position gap prevention means which prevents the position gap with the own axial center of a load measurement unit and the axial center of the aforementioned disk spring, and for the aforementioned caulking unit to possess the 2nd position gap prevention means which make go away in order to close the aforementioned body, and has punch, and prevents the position gap with the axial center of the caulking punch, and the axial center of the aforementioned bracket

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] this invention relates to the torque adjusting device of the friction clutch used as impact-absorption equipment of for example, the starter for automobiles.
[0002]
[Description of the Prior Art] These people applied for "a friction clutch and its torque adjustment method" in Japanese Patent Application No. No. 49718 [eight to]. This friction clutch consists of the bracket which has disk-like the plate section and the boss section, a rotation disk which rotates when predetermined torque is added, a fixed disk which pinches this rotation disk between the plate sections, and carries out friction engagement with a rotation disk, and a disk spring which pressurizes this fixed disk, as shown in drawing 4 . Torque adjustment is performed by the welding pressure (the amount of bending) of the disk spring to which this friction clutch pressurizes a fixed disk. The disk spring is fixed in the position which generates the predetermined amount of bending to a fixed disk by measuring the load when producing the predetermined amount of bending beforehand with the disk spring simple substance, attaching to a work after that and closing the boss section based on the aforementioned measurement data. Thereby, the always stabilized setting torque is acquired.
[0003]
[Problem(s) to be Solved by the Invention] However, although it is necessary to make the measurement data beforehand measured with the disk spring simple substance, and the work which attached the disk spring correspond by the torque adjustment method of point **, the concrete method is not indicated. For this reason, based on other measurement data, the boss section may be kept in total to the disk spring attached to the work. In this case, since the amount of bending of a disk spring changes (the predetermined amount of bending is not obtained), exact torque adjustment cannot be performed. Moreover, since the amount of caulkings of the boss section will change inevitably if the measurement error by the position gap with the measurement unit and disk spring arises in case the load of a disk spring is measured, too exact torque adjustment cannot be performed. Furthermore, in the case of the caulking process of the boss section, the axial center of a bracket, and since [if it closes and an unbalanced load occurs by the position gap with the axial center of punch,] a disk spring is unfixable by the equal load (caulking force), the life fall of a friction clutch is caused. this invention was accomplished based on the above-mentioned situation, and the purpose is in offering the torque adjusting device of the friction clutch which can perform exact torque adjustment.
[0004]
[Means for Solving the Problem]
(Means of a claim 1) The torque adjusting device of this invention The load measurement unit which measures beforehand the load at the time of making a disk spring generate the predetermined amount of bending, The caulking unit which makes a disk spring generate the predetermined amount of bending for the body of a bracket in total to the work with which the disk spring [finishing / load measurement] was attached, It has the control unit which controls the operation of a caulking unit based on the measured value measured in the load measurement unit. the control unit The arithmetic unit which computes the controlled variable of a caulking unit from the measured value measured in the load measurement unit, After a work and controlled-variable data have corresponded from the matching means to which the work with which the disk spring [finishing / measurement] was attached in the load measurement unit, and the controlled-variable data computed with the arithmetic unit are made to correspond, and this matching means It has cylinder-control equipment which controls the operation of a caulking unit based on controlled-variable data. According to this invention, by controlling the operation of a caulking unit by the matching means based on the controlled-variable data, since it is made to correspond with the work with which the disk spring [finishing / measurement] was attached, and the controlled-variable data computed based on the load measured value of a disk

spring, the amount of bending of a disk spring can be adjusted to the set point (the predetermined amount of bending), and exact torque adjustment can be performed.

[0005] (Means of a claim 2) A load measurement unit possesses the 1st position gap prevention means which prevents the position gap with the own axial center of a load measurement unit and the axial center of a disk spring, and in order that a caulking unit may close a body, it is made to go away, it has punch, and possesses the 2nd position gap prevention means which prevents the position gap with the axial center of the caulking punch, and the axial center of a bracket. Since according to this invention the position gap with the own axial center of a load measurement unit and the axial center of a disk spring can be prevented by the 1st position gap prevention means in case a load is measured with a disk spring simple substance, the measurement error by position gap can be abolished. Consequently, it becomes possible to perform exact torque adjustment. Moreover, since the position gap with the axial center of caulking punch and the axial center of a bracket can be prevented by the 2nd position gap prevention means in the case of the caulking process by the caulking unit, generating of the unbalanced load by position gap can be lost. Consequently, since a disk spring is fixable by the equal load (caulking force), the life fall of a friction clutch can be prevented.

[0006]

[Embodiments of the Invention] Next, the example of this invention is explained based on a drawing. Drawing 1 is process drawing in which it is shown like the assembler of a friction clutch. The friction clutch 1 of this example is used as a shock buffer of for example, the starter for automobiles, and as shown in drawing 4 , it consists of the bracket 2, a rotation disk 3, a fixed disk 4, and disk spring 5 grade. A bracket 2 is formed with material, such as carbon steel and aluminum, and has outer case section 2b and boss section 2c (body of this invention) of the shape of a cylinder extended in this direction from outer case section 2b which intersects perpendicularly to plate section 2a from the periphery edge of plate section 2a of an annular solid (the shape of an anchor ring), and this plate section 2a, and is extended to tubed, and the inner circumference edge of plate section 2a. 2d of circular stages centering on boss section 2c is established in the periphery of boss section 2c at plate section 2a. As for 2d of this circular stage, board thickness is thickly prepared from 2d of circular stages by the board thickness of the rotation disk 3 to plate section 2a of a periphery. Moreover, two or more heights 2e is prepared in the upper surface of 2d of circular stages. The bearing 6 which consists of oil impregnation metal is attached in the main hole of boss section 2c. This bearing 6 is supported free [rotation of the drive shaft which is not illustrated].

[0007] The rotation disk 3 was formed in the annular solid which has two or more salient 3a on a periphery, and has fitted into the periphery of 2d of circular stages of plate section 2a free [sliding]. In addition, salient 3a prepared in the periphery of the rotation disk 3 is connected with the internal gear (not shown) of the epicycle reduction gear which slows down rotation of a starter motor (armature). A fixed disk 4 is formed in the annular solid which fits into the periphery of boss section 2c, and is arranged in piles at the upper part of the rotation disk 3. It fits into heights 2e by which two or more fitting holes (not shown) made in the front face were established in plate section 2a, rotation regulation is carried out, and this fixed disk 4 is carrying out friction engagement with the rotation disk 3 by being pressurized by the disk spring 5. A disk spring 5 is accumulated on the upper part of a fixed disk 4, is pressed by 2f of variant parts formed in a part or the perimeter of boss section 2c, generates the predetermined amount of bending to a fixed disk 4, and is pressurizing the fixed disk 4.

[0008] Next, the torque adjustment method of the above-mentioned friction clutch 1 is explained. Torque adjustment of a friction clutch 1 is performed by the torque adjusting device explained in full detail below. The load measurement unit 7 (it lower-**) which measures the load of a disk spring 5 as a torque adjusting device is shown in process drawing of drawing 1 or drawing 2 , To a bracket 2, the rotation disk 3 and a fixed disk 4 The part attachment unit 8 to attach, the disk spring attachment unit 9 which attaches the disk spring [finishing / load measurement] 5 to the work W in the state where the rotation disk 3 and the fixed disk 4 were attached to the bracket 2 in this part attachment unit 8 (unfinished item of manufacture process), The caulking unit 10 (it lower-**) which closes boss section 2c of a bracket 2 to the work W with which the disk spring 5 was attached, It consists of transfer means 12 grades which transfer automatically to a position the control unit 11 (it lower-**), the disk spring 5, and Work W which control the operation of the caulking unit 10 based on the measured value measured in the load measurement unit 7 according to the order of a process.

[0009] Before the load measurement unit 7 attaches a disk spring 5 to Work W (that is, state of disk spring 5 simple substance), it measures and records the load when generating the predetermined amount of bending on a disk spring 5, and as shown in drawing 5 , it possesses receptacle fixture 7A which receives the disk spring 5 for measurement, and test-section 7B which adds and measures a load to a disk spring 5. Guide section 7a when setting a disk spring 5 is prepared in receptacle fixture 7A. This guide section 7a has given only the margin which can absorb a part for the variation rate of the direction of a path of a disk spring 5, when a disk spring 5 is compressed in response to the load of test-section 7B. Moreover, as shown in drawing 5 (a), as shown in drawing 5 (b), the convex configuration which

guides the bore of a disk spring 5 is sufficient [the shape of a concave which guides the outer diameter of a disk spring 5 has as guide section 7a, and] as it. On the other hand, when adding a load to a disk spring 5, guide section 7b for preventing the position gap with a disk spring 5 is prepared in test-section 7B. As shown in drawing 5 (a), the convex configuration which guides the bore of a disk spring 5 is sufficient as this guide section 7b, and as shown in drawing 5 (b), the shape of a concave which guides the outer diameter of a disk spring 5 has as it.

[0010] The caulking unit 10 possesses caulking punch 10A (refer to drawing 6) which operates in the pressurization cylinder which a disk spring 5 is not made to generate the predetermined amount of bending in total, and does not illustrate boss section 2c of a bracket 2 to the work W with which the disk spring [finishing / load measurement] 5 was attached. This caulking unit 10 is equipped with the position gap prevention means for preventing the position gap with the axial center of caulking punch 10A, and the axial center of boss section 2c in the case of a caulking process. The position gap prevention means consists of guide section 10a which regulates the position of Work W to the pallet 13 which sets Work W, and guide section 10b prepared in caulking punch 10A, as shown in drawing 6 . Guide section 10a has prevented the position gap of Work W to a pallet 13 by being inserted in the center section of the pallet 13 through opening 13a which carries out opening in the main hole of boss section 2c from the pallet 13 bottom. On the other hand, guide section 10b is caulking punch 10A Made to go away, from the section, is projected below, and is prepared by the inner circumference side, and the position gap with the axial center of caulking punch 10A and the axial center of boss section 2c can be prevented by being inserted in the inner circumference of the bearing 6 currently attached in boss section 2c in the case of a caulking process. In addition, the method of raising and positioning the precision of both (a pallet 13 and Work W) inlaw section as a means to regulate the position of Work W to a pallet 13 is also employable.

[0011] A control unit 11 consists of the arithmetic unit 14 which calculates the movement magnitude of a pressurization cylinder from the measured value measured in the load measurement unit 7, movement magnitude data of the pressurization cylinder computed with this arithmetic unit 14, a matching means 15 to which the work W with which the disk spring [finishing / load measurement] 5 is attached is made to correspond, and cylinder-control equipment 16 grade which controls the movement magnitude of a pressurization cylinder based on movement magnitude data, as shown in drawing 3 . The circular table method showing the work W set to the pallet 13 in each conveyer method which is made to convey in order of a process and is shown in drawing 1 , or drawing 2 can be used for it while the transfer means 12 transfers the disk spring 5 measured in the load measurement unit 7 to the disk spring attachment unit 9.

[0012] Next, the manufacturing process (torque adjustment process) of a friction clutch 1 is explained. First, the load measurement unit 7 is alone equipped with a disk spring 5, as shown in drawing 5 , a load is added to a disk spring 5 in the state where the mutual axial center was made in agreement, a load in case a disk spring 5 generates the predetermined amount of bending is measured, and the measured value is transmitted to an arithmetic unit 14. In an arithmetic unit 14, after calculating a caulking size and converting the caulking size into the movement magnitude of a pressurization cylinder from the transmitted data, it is transmitted to the matching means 15. On the other hand, as parts other than disk spring 5 are shown in drawing 1 , after the rotation disk 3 and a fixed disk 4 are attached to a bracket 2 by the part attachment unit 8, it is transferred by the transfer means 12 to the disk spring attachment unit 9, and the aforementioned disk spring [finishing / load measurement] 5 is attached by the disk spring attachment unit 9.

[0013] The work W with which the disk spring 5 was attached is transferred by the transfer means 12 to the caulking unit 10. After correspondence with the measurement data (load) of a disk spring 5 is checked by the matching means 15, as shown in drawing 6 , where the position gap with the axial center of caulking punch 10A and the axial center of a bracket 2 (boss section 2c) is prevented When caulking punch 10A carries out specified quantity descent and makes the periphery of boss section 2c deform plastically, the disk spring 5 pressed by 2f of the variant part is fixed in the position which generates the predetermined amount of bending.

[0014] (Effect of this example) At this example, since the work W with which the disk spring [finishing / load measurement] 5 was attached, the movement magnitude data of the pressurization cylinder computed based on the load measured value of a disk spring 5, and the matching means 15 to which it is made to correspond are provided, where correspondence with Work W and movement magnitude data is checked by the matching means 15, an actual caulking process can be performed. Consequently, since the situation where boss section 2c is closed based on other measurement data can be prevented to the disk spring 5 attached to Work W and the amount of bending of a disk spring 5 can be controlled certainly, exact torque adjustment can be performed.

[0015] Moreover, in the load measurement unit 7, since load measurement can be performed where the position gap with the axial center of load measurement unit 7 self and the axial center of a disk spring 5 is prevented, the measurement error by both position gap can be abolished, and exact torque adjustment can be performed. Furthermore, in the caulking unit 10, since it can close where the position gap with the axial center of caulking punch 10A and the

axial center of a bracket 2 is prevented, generating of the unbalanced load by both position gap can be lost, and thereby, since a disk spring 5 is fixable by the equal load (caulking force), the life fall of a friction clutch 1 can be prevented.

[0016] In addition, although the bore side of a disk spring 5 is closed by the plastic deformation of boss section 2c in the above-mentioned example, as shown in drawing 7 and 8, it is good also as composition which closes the outer-diameter side of a disk spring 5. That is, the inner skin of 2g of bodies prepared in the periphery of a bracket 2 by caulking punch 10A (not shown) is made to deform plastically, and the disk spring 5 pressed at 2f (two or more places are prepared in the hoop direction in drawing 8) of the variant part is fixed in the position which generates the predetermined amount of bending. In this case, since 2g of bodies for closing a disk spring 5 is prepared in the periphery side of plate section 2a, it becomes possible to make the generating part of frictional force into path size, and planar pressure of a fixed disk 4 can be made small. Since the force of joining the component part (a bracket 2, the rotation disk 3, a fixed disk 4, disk spring 5 grade) of a friction clutch 1 becomes small by this, intensity of a component part can be made low and the cheap friction clutch 1 can be offered.

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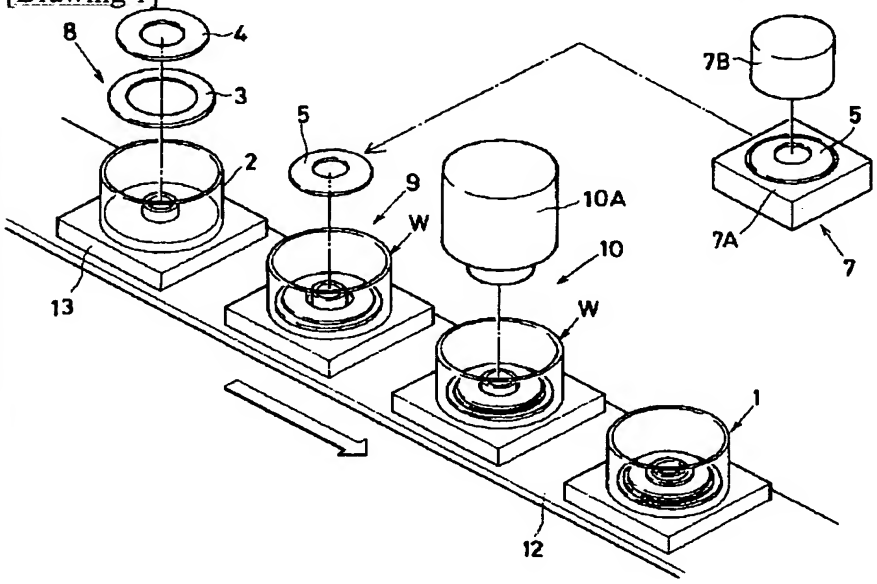
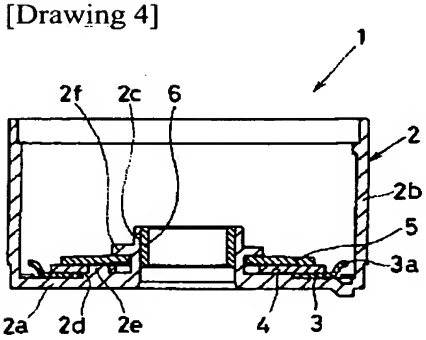
DRAWINGS

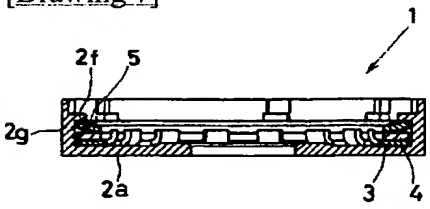
[Drawing 1]



[Drawing 4]



[Drawing 7]



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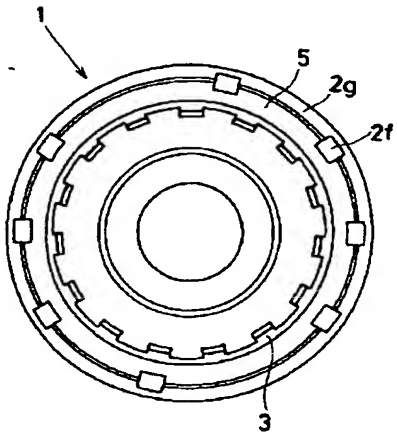
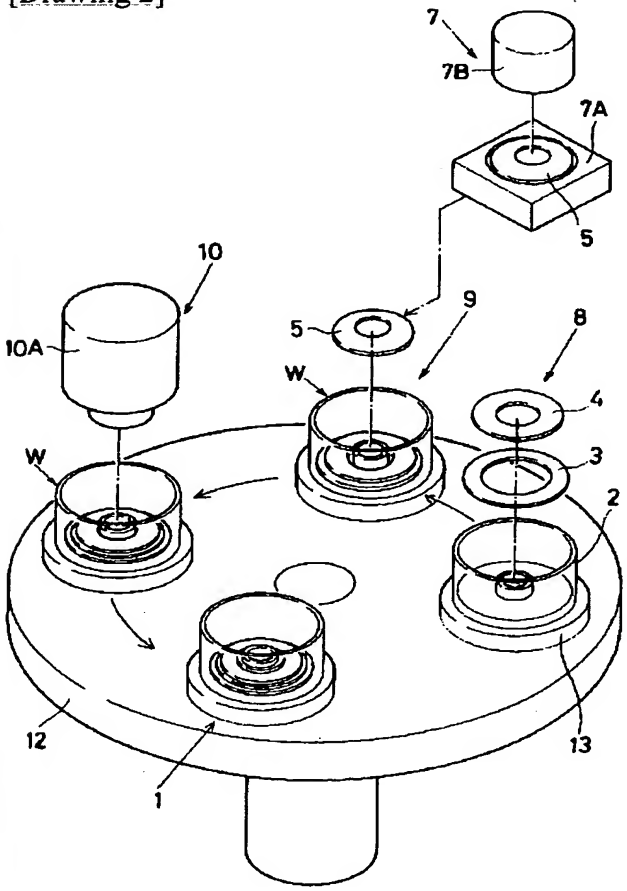


[Drawing 2]



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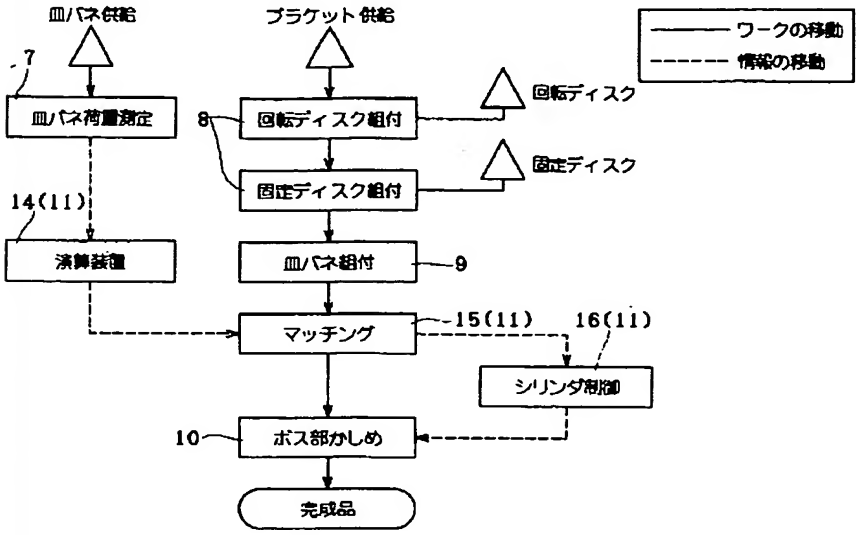
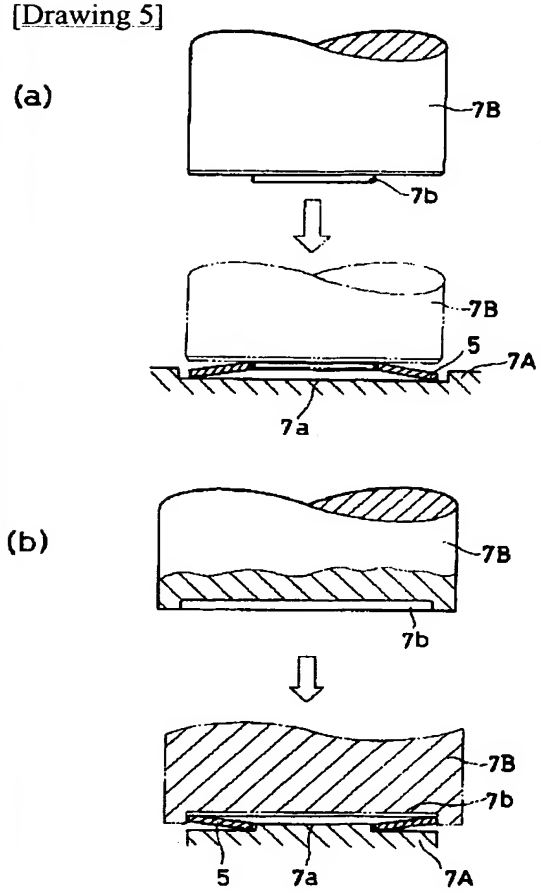
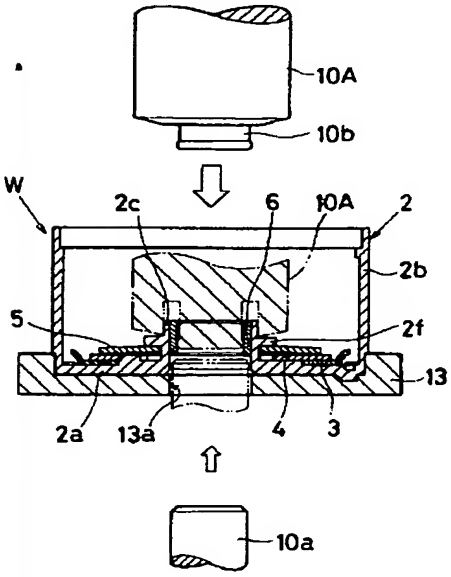


[Drawing 5]



[Drawing 6]



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